

10/582212

AP3 Rec'd PCT/PTO 08 JUN 2003

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DETAILED DESCRIPTION

[Detailed explanation of a design]

[0001]

[Industrial Application]

Although this design consists of the annular base section which contacts especially the front face of a piston, the inner circumference lip section which extends from the inner circumference edge of this base section to the front, and **** to the attachment shank of the front face of a piston, and the periphery lip section which it extends [section] from the periphery edge of this base section to the front, and makes the front end close to the cylinder hole inner skin of a cylinder body about the cup seal for master cylinders used for actuation of the hydraulic brake of an automobile, a clutch, etc., it is related with amelioration.

[0002]

[Description of the Prior Art]

The ***** cup seal is already known as indicated by JP,56-135347,U.

[0003]

[Problem(s) to be Solved by the Device]

The high seal nature which the periphery lip section carries out the pressure welding of the ***** cup seal to the inner skin of a cylinder hole at the time of piston advance, and prevents leakage of the pressure from the oil pressure room by the side of the front face of a cup seal, and the supply nature which the periphery lip section bends [nature] to the method of the inside of radial, and makes hydraulic oil supply to said oil pressure room from the supply oil sac by the side of a cup seal tooth back at the time of piston retreat are required. If the whole cup seal is fabricated with the high rubber of flexibility in order to satisfy these demands Eat into the relief port as for which the back end section of the periphery lip section carries out opening to cylinder hole inner skin at the time of the pressure up of said oil pressure room, or If eat away between cylinder hole inner skin and a piston periphery edge, it is damaged, and the life is made to fall and a cup seal is fabricated with rubber with a high degree of hardness for the improvement in a life, it will become impossible to satisfy an expected demand.

[0004]

So, although what was going to form annular recess in the back end section periphery of the periphery lip of a cup seal, and was going to prevent the above interlocking phenomena is indicated by said official report, the thickness of the back end section of the periphery lip section decreases in it by formation of recess, and there is **** which causes a fall on the strength by this in it.

[0005]

This design was made in view of the ***** situation, and aims at satisfying seal nature and supply

nature, and offering **** and said cup seal with high endurance.

[0006]

[Means for Solving the Problem]

In order to attain the above-mentioned purpose, this design is characterized by setting hind one up for the periphery degree of hardness of the periphery lip section highly rather than anterior part while forming it so that a clearance may produce the periphery lip section between the posterior part and cylinder hole inner skin in the free condition.

[0007]

[Example]

Hereafter, the example which applied this design to the tandem form master cylinder for brakes of an automobile with the drawing is explained.

[0008]

First, in drawing 1, cylinder hole 1a which closed the front end is formed in the cylinder body 1, and fitting of the sliding of anterior part piston 2f and posterior part piston 2r is made free to it at this cylinder hole 1a. The anterior part piston 2f, anterior part oil pressure room 3f is formed between cylinder hole 1a front end walls, and posterior part both the pistons 2f and 2r form posterior part oil pressure room 3r a front in the meantime, and two brake hydraulic circuits of an automobile are connected to the output ports 4f and 4r of these oil pressure rooms 3f and 3r, respectively.

[0009]

The back end is equipped with the secondary cup seal 6 with which the cup seals 5 and 5 by this design about which a front face faces the posterior part pistons 2f and 2r the posterior part oil pressure rooms 3f and 3r a front, respectively made reverse the sense of the above-mentioned cup seal 5 and a lip anterior part piston 2f by equipping the front end a front.

[0010]

A front, the back pistons 2f and 2r make pars intermedia a minor diameter, respectively, and form the supply oil sacs 7f and 7r between cylinder hole 1a inner skin, and the oil galleries 8f and 8r which make the tooth back of the cup seals 5 and 5 open these supply oil sacs 7f and 7r for free passage are drilled in the front end section of Pistons 2f and 2r.

[0011]

Anterior part oil pressure room 3f is adjoined, the auxiliary cylinder-like sump 10 protrudes on one, and the main sump 11 made of synthetic resin is attached in the top section of a cylinder body 1 at the upper limit section. If the well-known float type fuel-level sensor 12 is installed in the main sump 11 and the fuel level in the main sump 11 falls below to convention level, an active signal will be sent to the alarm which is not illustrated.

[0012]

When the auxiliary sump 10 is divided into the posterior part sump rooms 14f and 14r the front by the septum 13 of a cylinder body 1 and one and each pistons 2f and 2r are located in predetermined *****, Anterior part sump room 14f is open for free passage through relief port 15f and supply port 16f to anterior part oil pressure room 3f and 7f of supply oil sacs. Moreover, the oilway 17 prolonged to back is open for free passage from posterior part sump room 14r through relief port 15r and supply port 16r to posterior part oil pressure room 3r and supply oil sac 7r.

[0013]

Posterior part piston 2r has ***** regulated by contacting the front end of the bearing 18 attached in the posterior part of cylinder hole 1a. Moreover, this piston 2r is equipped with the piston rod 20 bearing of the sliding of is made free to bearing 18 through the seal member 19, and the output lever 21 of the booster operated by the brake pedal which is not illustrated to this

piston rod 20 is connected.

[0014]

22f of anterior part return springs which energize anterior part piston 2f in the retreat direction is held in anterior part oil pressure room 3f, and the piston spacing regulation equipment 23 which determines ***** which is anterior part piston 2f is formed between both pistons 2f and 2r.

[0015]

Piston spacing regulation equipment 23 consists of a fixed back plate 25 fixed to the front end of posterior part piston 2r with the bolt 24, a movable back plate 26 which can slide by the stroke to which the above-mentioned bolt 24 top was restricted, and posterior part return spring 22r ****(ed) between both the back plates 25 and 26, and the set load of the return spring 22r is set up more greatly than that of 22f of anterior part return springs.

[0016]

(ing), posterior part return spring 22r extends spacing of both the back plates 25 and 26 to the maximum extent, and usually holds both the pistons 2f and 2r to predetermined ***, respectively by in collaboration with 22f of anterior part return springs.

[0017]

In drawing 2 and drawing 3 the anterior part piston 2f cup seal 5 Annular base section 5b to which 8f of anterior part piston 2f oil galleries contacts the front face which carries out opening through a spacer 27, Inner circumference lip section 5i of the shape of a cylinder which extends from the inner circumference edge of this base section 5b to the front, It consists of cone tubed periphery lip section 5o which extends so that the diameter may be gradually expanded toward the front from the periphery edge of base section 5b. ****(ing) inner circumference lip section 5i on attachment shank 28 periphery which projects from an anterior part piston 2f front core, periphery lip section 5o makes the major diameter of the front end close to the inner skin of cylinder hole 1a.

[0018]

It is formed so that the posterior part peripheral face may produce a clearance 29 between cylinder hole 1a inner skin in the free condition, the above-mentioned periphery lip section 5o is applied to the posterior part peripheral face and tooth back, and elastic ring-reinforcement 5B lays it underground, and it is joined. Thus, the cup seal 5 is built by the two-layer structure of body of seal 5A, and elastic ring-reinforcement 5B, in that case, the same degrees of hardness 60-Hs 70 as the conventional cup seal are given to body of seal 5A, and degrees of hardness 80-Hs 85 are given to ring-reinforcement 5B. Therefore, it means that a posterior part is higher than anterior part, and the degree of hardness of the peripheral face of periphery lip section 5o was set up. Two or more notching 30 for runs and 30 -- are prepared in the peripheral face of ring-reinforcement 5B at hoop direction regular intervals.

[0019]

Fitting of the annular retainer 31 is carried out to the front end section periphery of inner circumference lip section 5i, and this retainer 31 is held by 22f of anterior part return springs.

[0020]

Since it is the same configuration as the anterior part piston 2f cup seal 5, the cup seal 5 of posterior part piston 2r omits the detailed explanation.

[0021]

Next, an operation of this example is explained.

[0022]

Before the output lever 21 of a booster, if the posterior part pistons 2f and 2r are made to move a front by back *****, since the pressure of the posterior part oil pressure rooms 3f and 3r will change a front according to it and the operation will be similarly produced a front at posterior part

both the oil pressure rooms 3f and 3r, only the operation by the side of anterior part oil pressure room 3f is explained below.

[0023]

As shown in drawing 2, when anterior part piston 2f occupies the retreat location, since that cup seal 5 is located in relief port 15f back, anterior part oil pressure room 3f is open for free passage with anterior part sump room 14f through this relief port 15f, and it is in the atmospheric pressure condition. Although the front end edge is close to cylinder hole 1a inner skin by periphery lip section 5o of the cup seal 5 at this time, the clearance 29 between cylinder hole 1a inner skin is enlarged as it goes back.

[0024]

However, by advance which is anterior part piston 2f, if the opening location whose front end edge of periphery lip section 5o of the cup seal 5 is relief port 15f is passed, since a free passage with anterior part oil pressure room 3f and relief port 15f will be severed, according to the amount of advance which is anterior part piston 2f, the pressure of anterior part oil pressure room 3f rises. And according to the pressure up of this oil pressure room 3f, periphery lip section 5o will expand to the method of the outside of radial, but since, as for the periphery of periphery lip section 5o, hind one is highly set up for the degree of hardness rather than anterior part by existence of ring-reinforcement 5B, the amount of expansion of periphery lip section 5o has less hind one than anterior part. As shown in drawing 4, only a difference in the opening location whose back end section of periphery lip section 5o is relief port 15f for this reason, at the time of **** Since the pressure of anterior part oil pressure room 3f is still comparatively low, lightly the posterior part of periphery lip section 5o to cylinder 1a inner skin in **** Or a small clearance will be secured still more between these inner skin, and interlocking of periphery lip section 5o into relief port 15f can be prevented.

[0025]

it is shown in drawing 5 -- as -- advance of anterior part piston 2f -- further -- progressing -- an anterior part oil pressure room -- it generates in 3f -- size -- even if it will be in the condition that the whole periphery lip section 5o carries out a pressure welding to cylinder hole 1a inner skin with a pressure, since the periphery side tooth back of base section 5b is also a high degree of hardness, it does not eat into each ** with cylinder hole 1a inner skin, a spacer 27, and an anterior part piston 2f front end edge by existence of supply ring 5B

[0026]

An improvement of the life of periphery lip section 5o is achieved in this way.

[0027]

*(ing), the pressure generated in anterior part oil pressure room 3f is transmitted to the brake which corresponds through 4f of output ports, and operates it.

[0028]

While contracting the posterior part of periphery lip section 5o in the original condition with reduced pressure of anterior part oil pressure room 3f at the time of retreat of anterior part piston 2f, as usual, the high front end of flexibility bends to the method of the inside of radial, and produces a clearance between cylinder hole 1a inner skin. Consequently, the hydraulic oil of 7f of anterior part supply oil sacs pushes away a spacer 27 through 8f of oil galleries, it flows into the anterior part oil pressure room 3f side from the above-mentioned clearance, and supply is performed.

[0029]

When superfluous supply was performed at this time and anterior part piston 2f returns to *****(i.e., when periphery lip section 5o comes to the back location which is relief port 15f), the amount

of that excess is flowing out of relief port 15f into anterior part sump room 14f.

[0030]

[Effect of the Device]

While forming according to this design as mentioned above so that a clearance may produce the periphery lip section between the posterior part and cylinder hole inner skin in the free condition. Rather than anterior part, since hind one was set up highly, the periphery degree of hardness of the periphery lip section. High flexibility can be given to the anterior part of the periphery lip section, seal nature and reinforcement nature can be secured, and rigidity can be given to the posterior part of the periphery lip section, interlocking of a between [a relief port, and cylinder hole inner skin and piston front end edges] can be prevented, and improvement in the endurance can be aimed at.

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CLAIMS

[Utility model registration claim]

[Claim 1] The annular base section which contacts the front face of a piston (2f, 2r) (5b), The inner circumference lip section which extends from the inner circumference edge of this base section (5b) to the front, and **** to the attachment shank (28) of the front face of a piston (2f, 2r) (5i), In the cup seal for master cylinders which consists of the periphery lip section (5o) which it extends [section] from the periphery edge of this base section (5b) to the front, and makes the front end close to the cylinder hole (1a) inner skin of a cylinder body (1) The cup seal for master cylinders characterized by setting hind one up for the periphery degree of hardness of the periphery lip section (5o) highly rather than anterior part while forming the periphery lip section (5o) so that a clearance (29) may be generated between the posterior part and cylinder hole (1a) inner skin in the free condition.

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The back end is equipped with the secondary cup seal 6 with which the cup seals 5 and 5 by this design about which a front face faces the posterior part pistons 2f and 2r the posterior part oil pressure rooms 3f and 3r a front, respectively made reverse the sense of the above-mentioned cup seal 5 and a lip anterior part piston 2f by equipping the front end a front.

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A front, the back pistons 2f and 2r make pars intermedia a minor diameter, respectively, and form the supply oil sacs 7f and 7r between cylinder hole 1a inner skin, and the oil galleries 8f and 8r which make the tooth back of the cup seals 5 and 5 open these supply oil sacs 7f and 7r for free passage are drilled in the front end section of Pistons 2f and 2r.

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Anterior part oil pressure room 3f is adjoined, the auxiliary cylinder-like sump 10 protrudes on one, and the main sump 11 made of synthetic resin is attached in the top section of a cylinder body 1 at the upper limit section. If the well-known float type fuel-level sensor 12 is installed in the main sump 11 and the fuel level in the main sump 11 falls below to convention level, an active signal will be sent to the alarm which is not illustrated.

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Piston spacing regulation equipment 23 consists of a fixed back plate 25 fixed to the front end of posterior part piston 2r with the bolt 24, a movable back plate 26 which can slide by the stroke to which the above-mentioned bolt 24 top was restricted, and posterior part return spring 22r ****(ed) between both the back plates 25 and 26, and the set load of the return spring 22r is set up more greatly than that of 22f of anterior part return springs.

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[0018]

It is formed so that the posterior part peripheral face may produce a clearance 29 between cylinder hole 1a inner skin in the free condition, the above-mentioned periphery lip section 5o is applied to the posterior part peripheral face and tooth back, and elastic ring-reinforcement 5B lays it underground, and it is joined. Thus, the cup seal 5 is built by the two-layer structure of body of seal 5A, and elastic ring-reinforcement 5B, in that case, the same degrees of hardness 60-Hs 70 as the conventional cup seal are given to body of seal 5A, and degrees of hardness 80-Hs 85 are given to ring-reinforcement 5B. Therefore, it means that a posterior part is higher than anterior part, and the degree of hardness of the peripheral face of periphery lip section 5o was set up. Two or more notching 30 for runs and 30 -- are prepared in the peripheral face of ring-reinforcement 5B at hoop direction regular intervals.

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Before the output lever 21 of a booster, if the posterior part pistons 2f and 2r are made to move a front by back *****, since the pressure of the posterior part oil pressure rooms 3f and 3r will change a front according to it and the operation will be similarly produced a front at posterior part

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[0023]

As shown in drawing 2, when anterior part piston 2f occupies the retreat location, since that cup seal 5 is located in relief port 15f back, anterior part oil pressure room 3f is open for free passage with anterior part sump room 14f through this relief port 15f, and it is in the atmospheric pressure condition. Although the front end edge is close to cylinder hole 1a inner skin by periphery lip section 5o of the cup seal 5 at this time, the clearance 29 between cylinder hole 1a inner skin is enlarged as it goes back.

[0024]

However, by advance which is anterior part piston 2f, if the opening location whose front end edge of periphery lip section 5o of the cup seal 5 is relief port 15f is passed, since a free passage with anterior part oil pressure room 3f and relief port 15f will be severed, according to the amount of advance which is anterior part piston 2f, the pressure of anterior part oil pressure room 3f rises. And according to the pressure up of this oil pressure room 3f, periphery lip section 5o will expand to the method of the outside of radial, but since, as for the periphery of periphery lip section 5o, hind one is highly set up for the degree of hardness rather than anterior part by existence of ring-reinforcement 5B, the amount of expansion of periphery lip section 5o has less hind one than anterior part. As shown in drawing 4, only a difference in the opening location whose back end section of periphery lip section 5o is relief port 15f for this reason, at the time of **** Since the pressure of anterior part oil pressure room 3f is still comparatively low, lightly the posterior part of periphery lip section 5o to cylinder 1a inner skin in **** Or a small clearance will be secured still more between these inner skin, and interlocking of periphery lip section 5o into relief port 15f can be prevented.

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An improvement of the life of periphery lip section 5o is achieved in this way.

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*(ing), the pressure generated in anterior part oil pressure room 3f is transmitted to the brake which corresponds through 4f of output ports, and operates it.

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While contracting the posterior part of periphery lip section 5o in the original condition with reduced pressure of anterior part oil pressure room 3f at the time of retreat of anterior part piston 2f, as usual, the high front end of flexibility bends to the method of the inside of radial, and produces a clearance between cylinder hole 1a inner skin. Consequently, the hydraulic oil of 7f of anterior part supply oil sacs pushes away a spacer 27 through 8f of oil galleries, it flows into the anterior part oil pressure room 3f side from the above-mentioned clearance, and supply is performed.

[0029]

When superfluous supply was performed at this time and anterior part piston 2f returns to *****(i.e., when periphery lip section 5o comes to the back location which is relief port 15f), the amount

of that excess is flowing out of relief port 15f into anterior part sump room 14f.

[0030]

[Effect of the Device]

While forming according to this design as mentioned above so that a clearance may produce the periphery lip section between the posterior part and cylinder hole inner skin in the free condition Rather than anterior part, since hind one was set up highly, the periphery degree of hardness of the periphery lip section High flexibility can be given to the anterior part of the periphery lip section, seal nature and reinforcement nature can be secured, and rigidity can be given to the posterior part of the periphery lip section, interlocking of a between [a relief port, and cylinder hole inner skin and piston front end edges] can be prevented, and improvement in the endurance can be aimed at.

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[Translation done.]

(書誌+要約+請求の範囲)

- (19)【発行国】日本国特許庁(JP)
- (12)【公報種別】公開実用新案公報(U)
- (11)【公開番号】実開平5-58540
- (43)【公開日】平成5年(1993)8月3日
- (54)【考案の名称】マスタシリンダ用カップシール
- (51)【国際特許分類第5版】

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(21)【出願番号】実願平4-1232

(22)【出願日】平成4年(1992)1月17日

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【識別番号】000226677

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(72)【考案者】

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(74)【代理人】

【弁理士】

【氏名又は名称】落合 健(外1名)

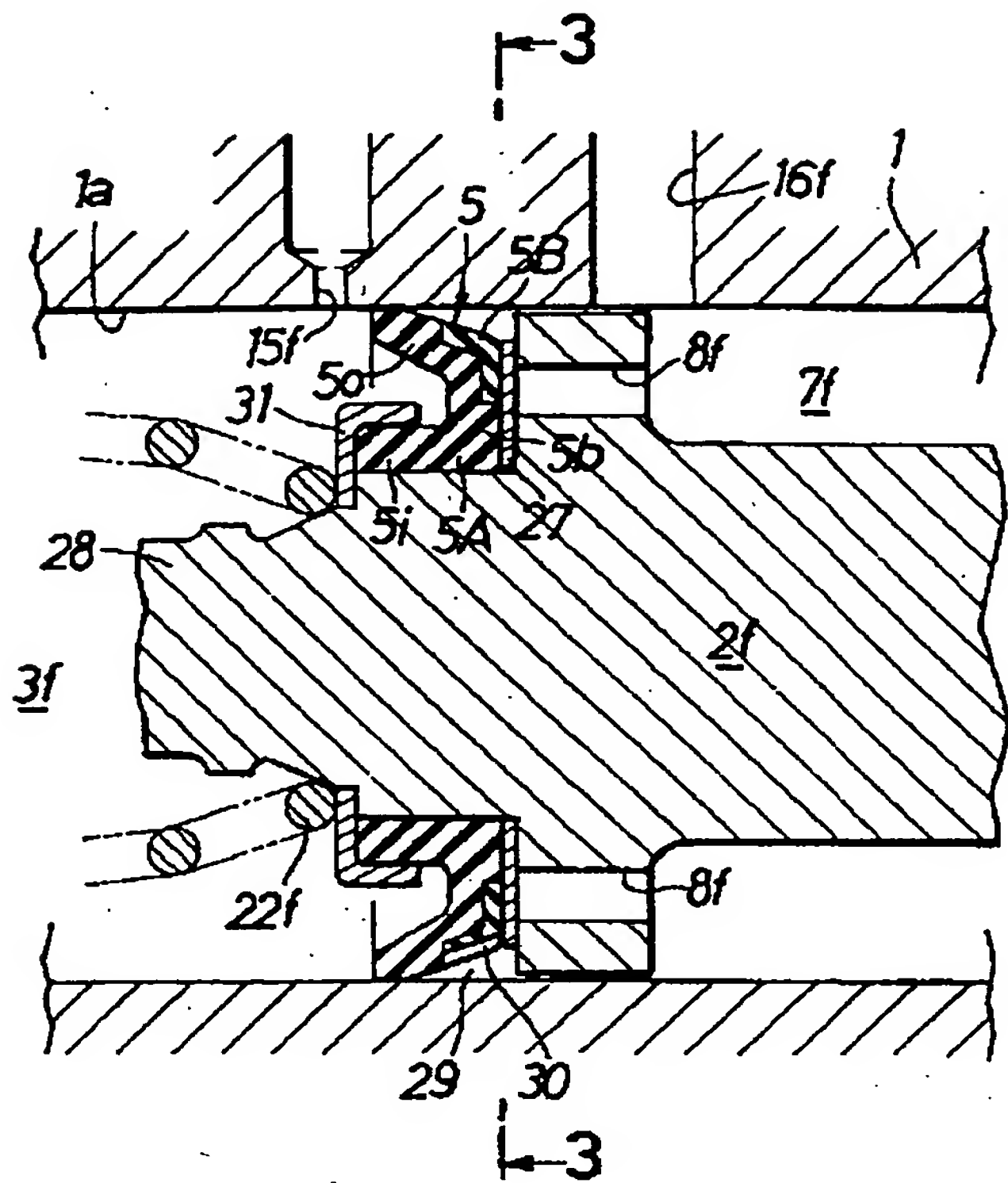
(57)【要約】

【目的】カップシールの、シリンダ孔内周面に前端を密接させる外周リップ部のシール性及び作動油補給性を確保しつつ、リリーフポートや、シリンダ孔内周面とピストン前端縁との間への食い込み損傷を防止する。

【構成】カップシール5の外周リップ部5oを、自由状態でその後部外周面と、シリンダ孔1a内周面との間に隙間29が生じるように形成すると共に、外周リップ部5oの後端外周に弾性補強環5Bを埋没することにより、外周リップ部5oの外周硬度を前部よりも後部の方を高く設定した。

【実用新案登録請求の範囲】

【請求項1】ピストン(2f, 2r)前面に当接する環状のベース部(5b)と、このベース部(5b)の内周端から前方へ延出してピストン(2f, 2r)前面の取付軸部(28)に密合する内周リップ部(5i)と、同ベース部(5b)の外周端から前方へ延出してシリンダ本体(1)のシリンダ孔(1a)内周面に前端を密接させる外周リップ部(5o)とからなる、マスタシリンダ用カップシールにおいて、外周リップ部(5o)を、その自由状態ではその後部とシリンダ孔(1a)内周面との間に隙間(29)が生じるように形成すると共に、外周リップ部(5o)の外周硬度を前部よりも後部の方を高く設定したことを特徴とする、マスタシリンダ用カップシール。



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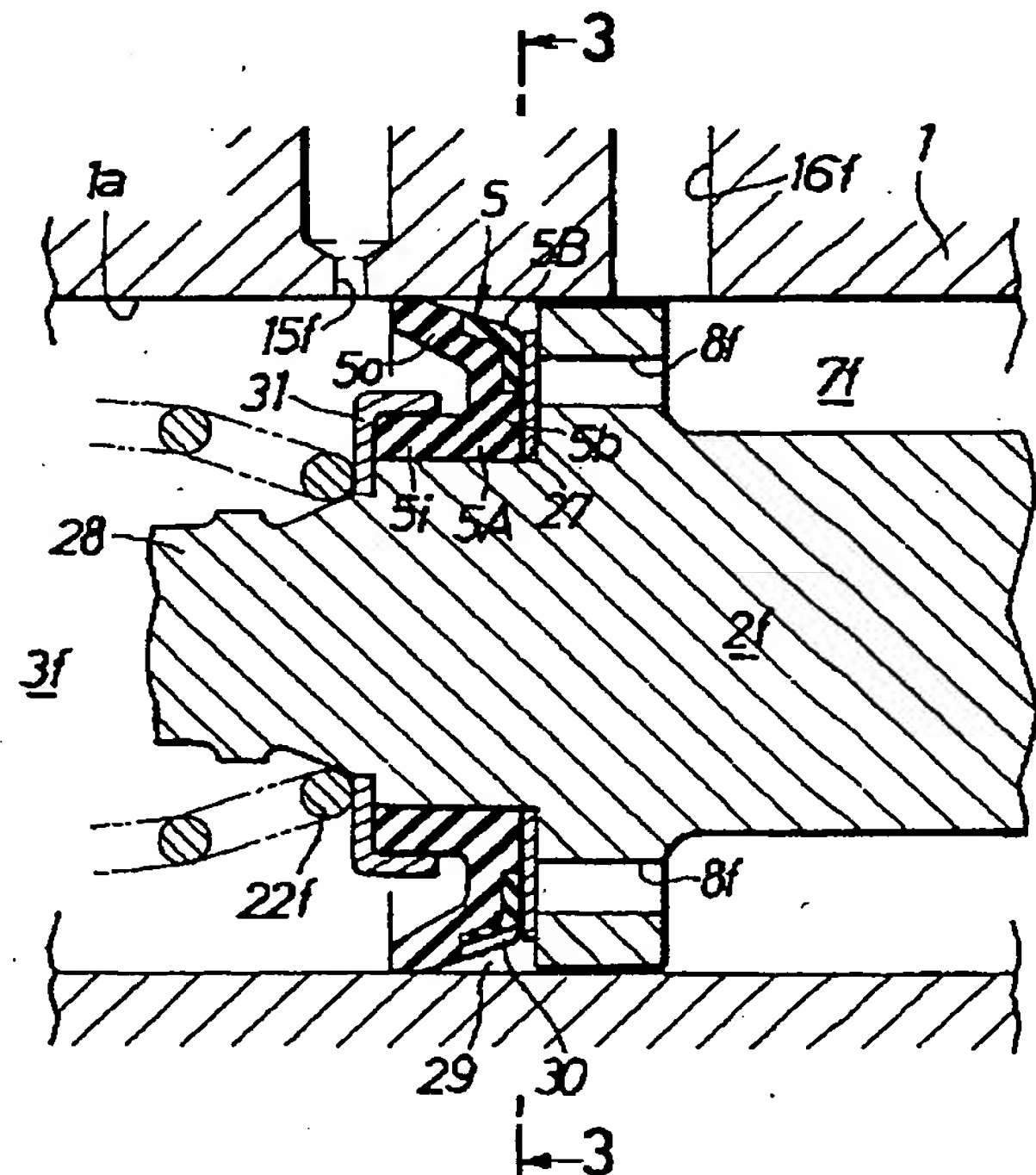
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(54)【考案の名称】 マスタシリング用カップシール

(57)【要約】

【目的】 カップシールの、シリンダ孔内周面に前端を密接させる外周リップ部のシール性及び作動油補給性を確保しつつ、リリーブポートや、シリンダ孔内周面とピストン前端縁との間への食い込み損傷を防止する。

【構成】 カップシール5の外周リップ部5oを、自由状態でその後部外周面と、シリンダ孔1a内周面との間に隙間29が生じるように形成すると共に、外周リップ部5oの後端外周に弾性補強環5Bを埋設することにより、外周リップ部5oの外周硬度を前部よりも後部の方を高く設定した。



【実用新案登録請求の範囲】

【請求項1】 ピストン（2 f, 2 r）前面に当接する環状のベース部（5 b）と、このベース部（5 b）の内周端から前方へ延出してピストン（2 f, 2 r）前面の取付軸部（2 8）に密合する内周リップ部（5 i）と、同ベース部（5 b）の外周端から前方へ延出してシリンダ本体（1）のシリンダ孔（1 a）内周面に前端を密接させる外周リップ部（5 o）とからなる、マスタシリンダ用カップシールにおいて、外周リップ部（5 o）を、その自由状態ではその後部とシリンダ孔（1 a）内周面との間に隙間（2 9）が生じるように形成すると共に、外周リップ部（5 o）の外周硬度を前部よりも後部の方を高く設定したことを特徴とする、マスタシリンダ用カップシール。

【図面の簡単な説明】

【図1】 本考案のカップシールを備えたタンデム型マス

タシリンダの縦断側面図

【図2】 図1の2部拡大図

【図3】 図2の3-3線断面図

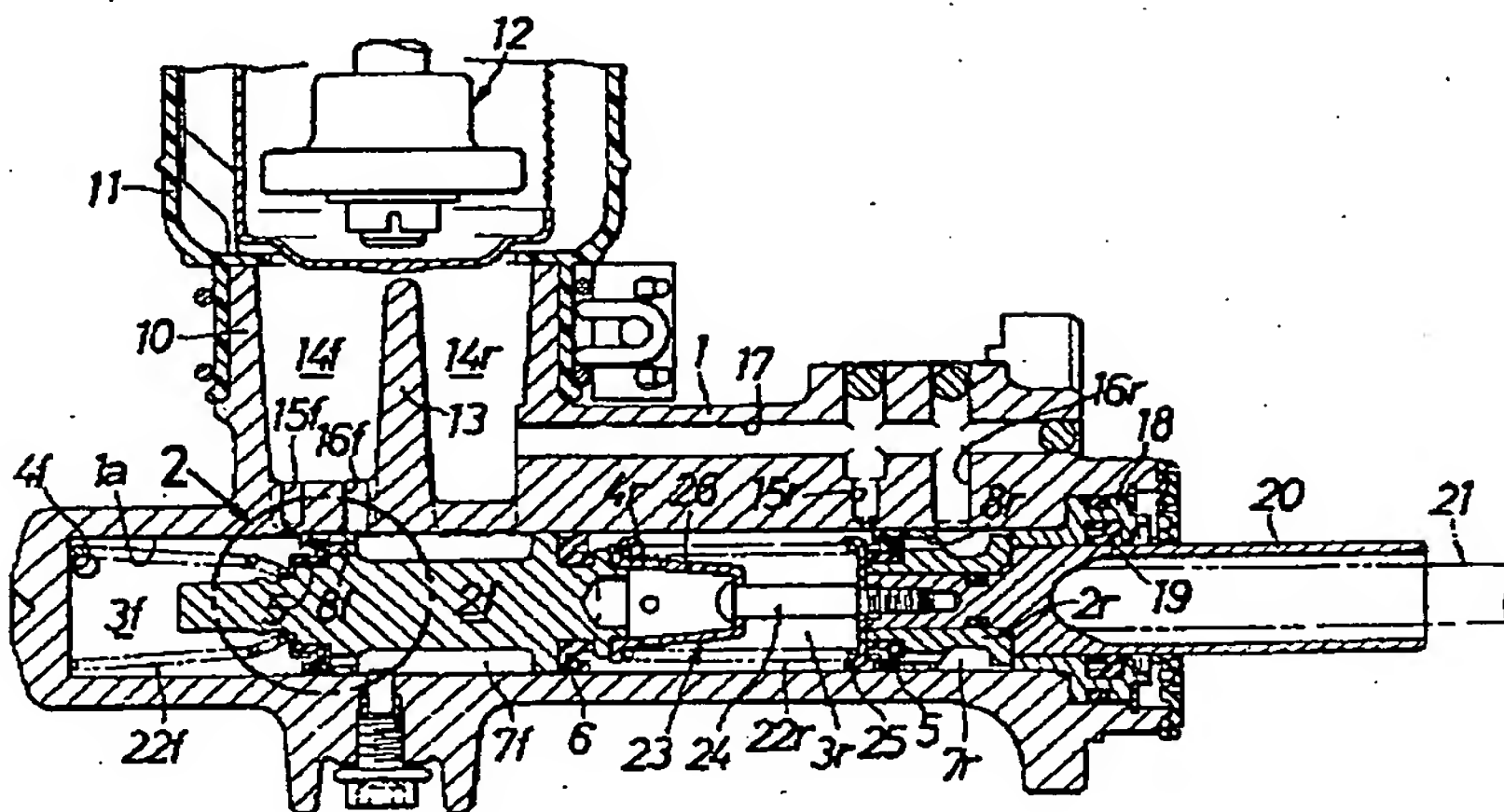
【図4】 作用説明図

【図5】 作用説明図

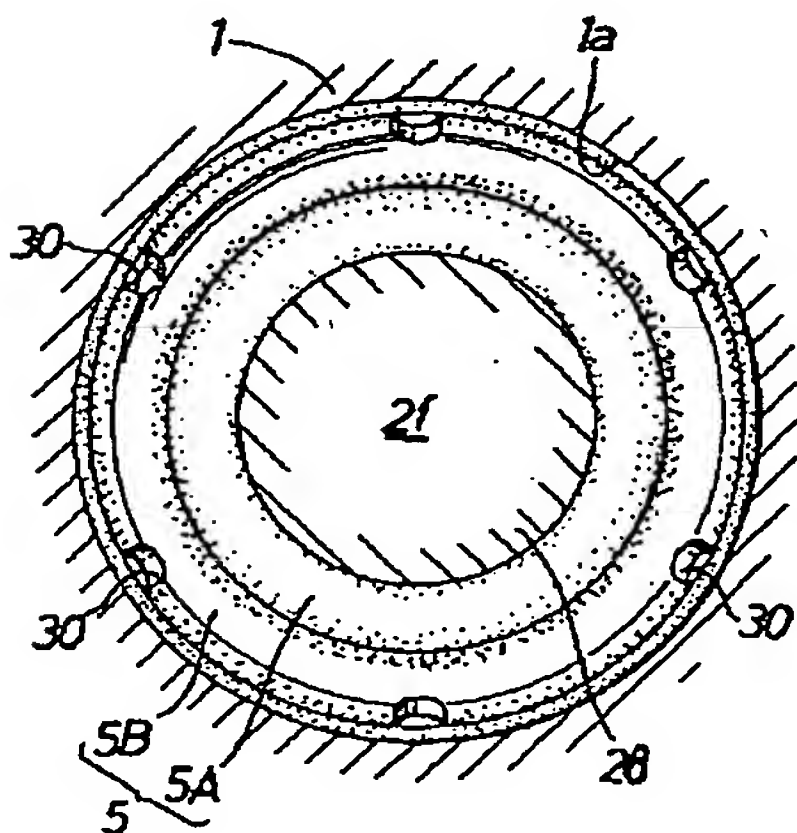
【符号の説明】

1	シリンダ本体
1 a	シリンダ孔
2 f, 2 r	ピストン
3 f, 3 r	油圧室
5	カップシール
5 A	シール本体
5 B	補強環
5 b	ベース部
5 i	内周リップ部
5 o	外周リップ部

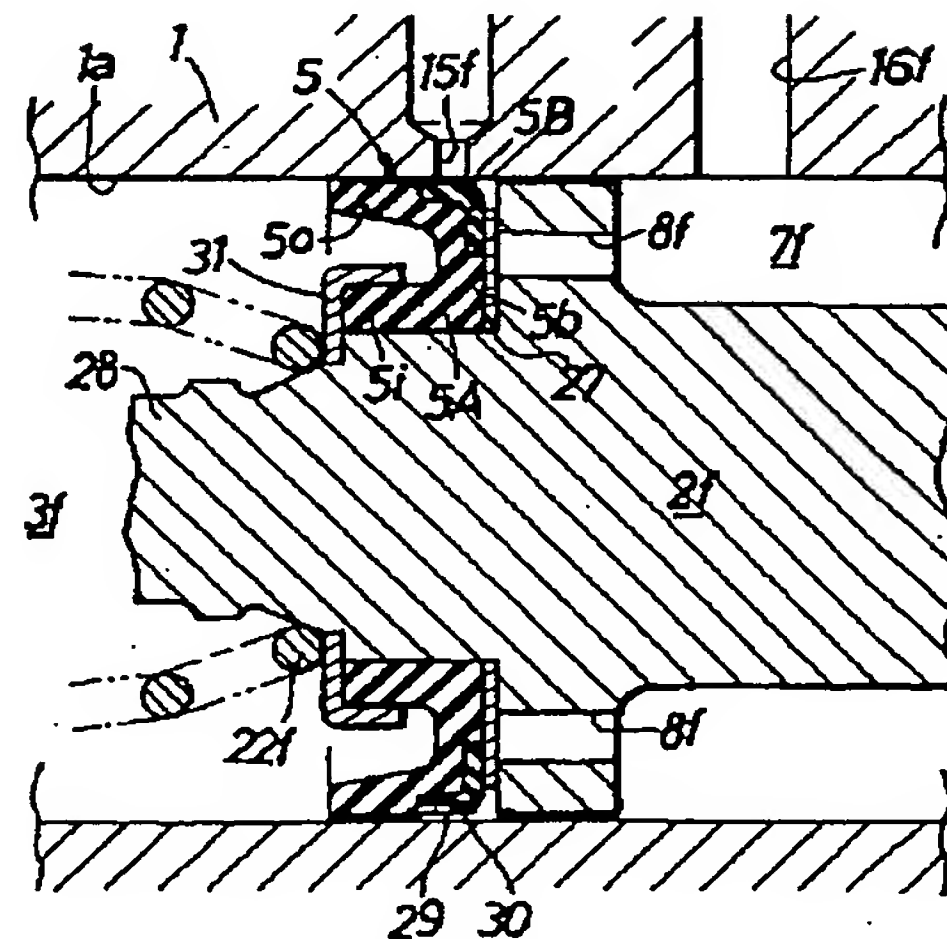
【図1】



【図3】



【図4】



【考案の詳細な説明】

【0001】

【産業上の利用分野】

本考案は、自動車の油圧ブレーキ、クラッチ等の作動に用いられるマスタシリンドラ用カップシールに関し、特にピストン前面に当接する環状のベース部と、このベース部の内周端から前方へ延出してピストン前面の取付軸部に密合する内周リップ部と、同ベース部の外周端から前方へ延出してシリンダ本体のシリンダ孔内周面に前端を密接させる外周リップ部とからなるものの改良に関する。

【0002】

【従来の技術】

かかるカップシールは、例えば実開昭56-135347号公報に開示されているように、既に知られている。

【0003】

【考案が解決しようとする課題】

かかるカップシールは、ピストン前進時、外周リップ部がシリンダ孔の内周面に圧接してカップシール前面側の油圧室からの圧力の漏洩を防ぐ高いシール性と、ピストン後退時、外周リップ部が半径方向内方へ撓んでカップシール背面側の補給油室から前記油圧室へ作動油を補給させる補給性とが要求される。これらの要求を満足させるべく、カップシール全体を柔軟性の高いゴムで成形すると、前記油圧室の昇圧時に、外周リップ部の後端部がシリンダ孔内周面に開口するリリースポートに食い込んだり、シリンダ孔内周面とピストン外周縁との間に食い込んだりして損傷し、その寿命を低下させることになり、またその寿命向上のために硬度の高いゴムでカップシールを成形すれば、所期の要求を満足させることができなくなる。

【0004】

そこで前記公報には、カップシールの外周リップの後端部外周に環状の逃げを形成して、上述のような食い込み現象を防止しようとしたものが開示されているが、逃げる形成により外周リップ部の後端部の肉厚が減少し、これにより強度低下を招く恐れがある。

【0005】

本考案は、かゝる事情に鑑みてなされたもので、シール性及び補給性を満足させつゝ、耐久性の高い前記カップシールを提供することを目的とする。

【0006】

【課題を解決するための手段】

上記目的を達成するために、本考案は、外周リップ部を、その自由状態ではその後部とシリンダ孔内周面との間に隙間が生じるように形成すると共に、外周リップ部の外周硬度を前部よりも後部の方を高く設定したことを特徴とする。

【0007】

【実施例】

以下、図面により本考案を自動車のブレーキ用タンデム形マスタシリンダに適用した実施例について説明する。

【0008】

先ず、図1において、シリンダ本体1には前端を閉じたシリンダ孔1aが形成されており、このシリンダ孔1aに前部ピストン2f及び後部ピストン2rが摺動自在に嵌合される。その前部ピストン2fは、シリンダ孔1a前端壁との間と前部油圧室3fを画成し、また前、後部両ピストン2f、2rは、その間に後部油圧室3rを画成し、これら油圧室3f、3rの出力ポート4f、4rに自動車の2系統のブレーキ油圧回路がそれぞれ接続される。

【0009】

前、後部ピストン2f、2rは、前面が前、後部油圧室3f、3rにそれぞれ臨む本考案によるカップシール5、5が前端に装着され、また前部ピストン2fは、上記カップシール5とリップの向きを逆にした2次カップシール6が後端に装着される。

【0010】

前、後ピストン2f、2rは、それぞれ中間部を小径にしてシリンダ孔1a内周面との間に補給油室7f、7rを画成し、これら補給油室7f、7rをカップシール5、5の背面に連通させる油孔8f、8rがピストン2f、2rの前端部に穿設される。

【0011】

シリンダ本体1の上側部には、前部油圧室3fに隣接して円筒状の補助油溜10が一体に突設され、その上端部に合成樹脂製の主油溜11が嵌着される。主油溜11には、公知のフロート式油面センサ12が設置されていて、主油溜11内の油面が規定レベル以下に低下すると、図示しない警報器に作動信号を送るようになっている。

【0012】

補助油溜10は、シリンダ本体1と一体の隔壁13により前、後部油溜室14f, 14rに仕切られており、各ピストン2f, 2rが所定の後退限に位置するとき、前部油溜室14fがリリーフポート15f及びサブライポート16fを介して前部油圧室3f及び補給油室7fに連通し、また後部油溜室14rから後方へ延びる油路17がリリーフポート15r及びサブライポート16rを介して後部油圧室3r及び補給油室7rに連通する。

【0013】

後部ピストン2rは、シリンダ孔1aの後部に嵌着された軸受18の前端に当接することにより後退限を規制される。また該ピストン2rは軸受18にシール部材19を介して摺動自在に支承されるピストンロッド20を備えており、このピストンロッド20に図示しないブレーキペダルにより操作されるブースタの出力杆21が接続される。

【0014】

前部油圧室3fには、前部ピストン2fを後退方向に付勢する前部戻しばね22fが收容され、前部ピストン2fの後退限を決定するピストン間隔規制装置23が両ピストン2f, 2r間に設けられる。

【0015】

ピストン間隔規制装置23は、後部ピストン2rの前端にボルト24により固定された固定座板25と、上記ボルト24上を限られたストロークで摺動し得る可動座板26と、両座板25, 26間に縮設された後部戻しばね22rとから構成され、その戻しばね22rのセット荷重は前部戻しばね22fのそれより大きく設定されている。

【0016】

而して、後部戻しばね22rは通常、両座板25、26の間隔を最大限に広げ、前部戻しばね22fとの協同により両ピストン2f、2rをそれぞれ所定の後退限に保持する。

【0017】

図2及び図3において、前部ピストン2fのカップシール5は、前部ピストン2fの油孔8fが開口する前面にスペーサ27を介して当接する環状のベース部5bと、このベース部5bの内周端から前方へ延出する円筒状の内周リップ部5iと、ベース部5bの外周端から前方へ向って漸次拡径するように延出する円錐筒状の外周リップ部5oとから構成され、内周リップ部5iは前部ピストン2fの前面中心部から突出する取付軸部28外周に密合し、外周リップ部5oは前端の大径部をシリンダ孔1aの内周面に密接させる。

【0018】

上記外周リップ部5oは、自由状態でその後部外周面がシリンダ孔1a内周面との間に隙間29を生じさせるように形成されており、その後部外周面及び背面にかけて弾性補強環5Bが埋設して接合される。このようにして、カップシール5はシール本体5Aと弾性補強環5Bの二層構造につくられ、その際、シール本体5Aには従来のカップシールと同様の硬度Hs60～70が与えられ、補強環5Bには硬度Hs80～85が与えられる。したがって、外周リップ部5oの外周面の硬度は、後部が前部よりも高く設定されたことになる。補強環5Bの外周面には、通油用の複数の切欠30、30…が周方向等間隔に設けられる。

【0019】

内周リップ部5iの前端部外周には環状のリテーナ31が嵌合され、このリテーナ31は前部戻しばね22fにより保持される。

【0020】

後部ピストン2rのカップシール5は、前部ピストン2fのカップシール5と同様の構成であるので、その詳細な説明は省略する。

【0021】

次にこの実施例の作用について説明する。

【0022】

プースタの出力杆21の前、後動操作により前、後部ピストン2f、2rを進退させれば、それに応じて前、後部油圧室3f、3rの圧力が変化するもので、その作用は前、後部両油圧室3f、3rにおいて同様に生じるので、前部油圧室3f側の作用についてのみに以下に説明する。

【0023】

図2に示すように、前部ピストン2fが後退位置を占めているとき、そのカップシール5はリリーフポート15fの後方に位置しているので、前部油圧室3fはこのリリーフポート15fを介して前部油溜室14fと連通していて、大気圧状態となっている。このときカップシール5の外周リップ部5oでは前端縁がシリンダ孔1a内周面に密接しているが、後方へ行くにつれてシリンダ孔1a内周面との間の隙間29を大きくしている。

【0024】

ところが前部ピストン2fの前進により、カップシール5の外周リップ部5oの前端縁がリリーフポート15fの開口位置を過ぎると、前部油圧室3fとリリーフポート15fとの連通が断たれるため、前部ピストン2fの前進量に応じて前部油圧室3fの圧力が上昇していく。そして該油圧室3fの昇圧によれば、外周リップ部5oは半径方向外方へ膨脹していくことになるが、外周リップ部5oの外周は、補強環5Bの存在により硬度が前部よりも後部の方が高く設定されているから、外周リップ部5oの膨脹量は前部より後部の方が少ない。このため図4に示すように、外周リップ部5oの後端部がリリーフポート15fの開口位置に差しかゝるときは、前部油圧室3fの圧力が未だ比較的低いこともあって、外周リップ部5oの後部はシリンダ1a内周面に軽く接するか、若しくは該内周面との間に僅少の隙間を尚も確保することになり、リリーフポート15f内への外周リップ部5oの食い込みを防止することができる。

【0025】

図5に示すように、前部ピストン2fの前進が更に進み、前部油圧室3fに発生する大なる圧力により外周リップ部5o全体がシリンダ孔1a内周面に圧接する状態となっても、補給環5Bの存在によりベース部5bの外周側背面も高硬度

であるため、シリンダ孔1 a 内周面とスペーサ2 7 及び前部ピストン2 f 前端縁との各間に食い込むことがない。

【0026】

かくして外周リップ部5 o の寿命の改善が図られる。

【0027】

而して、前部油圧室3 f に発生した圧力は出力ポート4 f を経て対応するブレーキに伝達してそれを作動させる。

【0028】

前部ピストン2 f の後退時には、前部油圧室3 f の減圧により外周リップ部5 o の後部は当初の状態に収縮すると共に、従来通り柔軟性の高い前端は半径方向内方へ撓んでシリンダ孔1 a 内周面との間に隙間を生じさせる。その結果、前部補給油室7 f の作動油が油孔8 f を通ってスペーサ2 7 を押しのけ、上記隙間から前部油圧室3 f 側へ流入し、補給が行われる。

【0029】

このとき過剰補給が行われると、前部ピストン2 f が後退限に戻ったとき、即ち外周リップ部5 o がリリーフポート1 5 f の後方位置へ来たとき、その過剰分はリリーフポート1 5 f から前部油溜室1 4 f へ流出している。

【0030】

【考案の効果】

以上のように本考案によれば、外周リップ部を、その自由状態ではその後部とシリンダ孔内周面との間に隙間が生じるように形成すると共に、外周リップ部の外周硬度を前部よりも後部の方を高く設定したので、外周リップ部の前部には高い柔軟性を与えてシール性及び補強性を確保することができ、また外周リップ部の後部には剛性を与えてリリーフポートや、シリンダ孔内周面とピストン前端縁との間への食い込みを防ぎ、その耐久性の向上を図ることができる。